

MAR13-2012-020511

Abstract for an Invited Paper
for the MAR13 Meeting of
the American Physical Society

Magnon drag thermopile¹

SERGIO O. VALENZUELA, Institució Catalana de Recerca i Estudis Avançats and Institut Catala de Nanotecnologia

Thermoelectric effects in spintronics are gathering increasing attention as a means of controlling spin information by using heat flow. Thermal magnons (spin-wave quanta) are expected to play a major role, however, the coupling between electrons and magnons in ferromagnetic metals remains poorly understood. We demonstrate a conceptually new device that enables us to gather information on magnon-electron scattering and magnon-drag effects [1]. The device resembles a thermopile formed by a large number of pairs of ferromagnetic wires placed between a hot and a cold source and connected thermally in parallel and electrically in series. By controlling the relative orientation of the magnetization in pairs of wires, the magnon drag can be studied independently of the electron and phonon drag thermoelectric effects. Measurements as a function of temperature reveal the effect on magnon drag following a variation of magnon and phonon populations. These results demonstrate the feasibility of directly converting magnon dynamics of nanomagnets into an electrical signal and could pave the way to novel thermoelectric devices for energy harvesting.

[1] M.V. Costache, G.A. Bridoux, I. Neumann and S.O. Valenzuela, *Nature Mater.* 11, 199 (2012).

¹This research was supported by the Spanish Ministerio de Ciencia e Innovación, MICINN (MAT2010-18065) and by the European Community's Seventh Framework Programme (FP7/2007-2013) under grant agreement NANOFUNCTION no 257375.